

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM
www.mass.gov/dos

HVAC SYSTEMS AND BUILDING MAINTENANCE GUIDELINES

Experience has shown that HVAC system and building maintenance can be important factors affecting indoor air quality. The following are important parameters that need to be addressed:

HVAC System Maintenance - The various components of an HVAC system should be maintained on a regular basis. This can be done by in-house personnel or contracted to an outside company. Documentation should be made of any HVAC maintenance. A checklist should show each maintenance item and the location that it was performed. This maintenance procedure should be compared to the maintenance frequency that is recommended by the manufacturer.

HVAC controls are the brain function of the HVAC system. They tell the HVAC system when to turn on such things as the heat or the air conditioning. HVAC controls information should be maintained on-site. They should be available to such people as the maintenance staff. The operating manual would include information on maintenance and calibration of the controls.

The clock settings for controls should be checked periodically. Power failures and day light savings time changes are times when settings may need to be adjusted.

Air balancing records should also be kept for the building. Information on the latest balancing report should be on file. This report provides vital information on supply and return air volumes to an area. Air balancing should be evaluated whenever the occupants report significant indoor air quality problems.

The "final" version of original design drawings by the HVAC engineer should be available. This would include information on the amount of supply air in cubic feet/minute(CFM) that were calculated be delivered to an area, as well as the type of occupancy for which the ventilation system was designed.

Proper access should be provided around ventilation equipment for routine maintenance and inspection which should include filter replacement and fan belt adjustment and replacement.

The items that should be checked and cleaned include (but are not limited to):

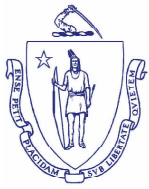
HVAC grilles - The supply and return grilles in an occupied space can reveal a significant amount about building custodial services

An assumption can be made that when there is water damage or condensation problems in a building, there is bound to be occupant complaints regarding moldy conditions.

Grilles that have a layer of dirt/debris on them should be wet wiped with a 1% bleach solution; and, the cause of the mold should be investigated and remedied. Any nearby ceiling tiles that are contaminated should be disposed of and replaced. Common 2' x 4' ceiling tiles are inexpensive to replace.

Supply grilles that have a layer of dust indicate that HVAC filters are not filtering supply air properly. A more efficient filter should be used to better filter incoming air.

Grilles that have a layer of dust on the return (exhaust grilles) indicate the need for better housekeeping. This is often an indication that floor/carpets are not being cleaned properly. This can often be remedied by more frequent vacuuming/floor cleaning.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM
www.mass.gov/dos

Drain pans - Drain pans must function properly. They must be checked to determine if they drain adequately and if they have been installed with adequate sloping. A quick visual inspection can determine if they are operating properly. Plugged drain pans can be a significant source of microbial contamination in a building.

Outdoor air intake louvers - These should be inspected for cleanliness and operation at least twice a year. Bird screens should be installed where past infestation problems by birds have been a problem.

Cooling towers - These should be treated according to the manufacturer's directions. The cooling towers should be treated to control the growth of microbes. Untreated cooling towers can contribute to the growth of respirable microbes such as Legionella.

The following items are additional items of an HVAC system that should be cleaned and checked on a schedule that is recommended by the manufacturer. In the absence of a manufacturer's schedule, a once a year evaluation should be performed of the following components:

<u>Fans</u>	<u>Outdoor air intake areas</u>	<u>Plenums</u>	<u>Heating coils and heat recovery coils</u>
<u>Humidifiers</u>	<u>Cooling coils and evaporative coolers</u>	<u>Air flow measuring stations</u>	

Filters - Filters should have a minimum efficiency of 25-30%. (The new rating system for filters is the Minimum Efficiency Reporting value system). A MER rating of 25-30% efficient is equivalent to a MER rating of 8. Maintenance should strive to purchase filters with an efficiency of 60% (or a value of 10-11 on the MER system). Inexpensive, furnace type filters should not be installed in a HVAC system. Often, these filters do not have a listed efficiency rating.

Pleated, accordion type, filters are a better choice than flat filters. They provide more surface area for filtering out particles.

High efficiency filters may need to be purchased and installed when there are significant number of complaints regarding indoor air quality. These filters are designed to filter at greater than 65% efficiency for particles down to 0.3 microns.

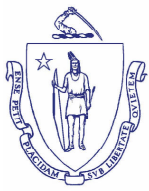
An HVAC system should be able to accommodate high efficiency filters. The static pressure in a system should not build up to the point where the addition of high efficiency filters causes a HVAC system to shut down.

Filters should be changed on a regular basis. This should be a minimum of twice a year. If the filters are extremely dirty before the six month period, they should be changed more frequently (i.e. quarterly).

A build up of dirt/dust on a filter ("dust cake") actually helps a filter to work more efficiently. A dust cake will build up a short period of time after a new filter is installed. Filter efficiency is actually a function of the filter plus the dust cake.

A visual inspection of the dirty filter should be taken to determine what type of particles the filter is trapping to try to minimize entrance of the contaminants into the ductwork. For example, the presence of feathers would indicate that birds have been in the ductwork. Chunks of fiberglass may indicate that fiberglass lined ducts are breaking apart.

The racks that hold filters should have a snug fit against HVAC duct work. They should minimize the bypass of air around filters.



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM
www.mass.gov/dos

Humidifiers - Humidifiers for the purpose of increasing atmospheric moisture are not recommended. This includes the installation of portable humidifiers to an occupied area. Humidifiers can have a negative impact on indoor air quality. This usually results from a humidifier not being properly maintained and/or installed.

Humidifiers, especially ones labeled as "ultrasonic," can significantly contribute to the growth of microbes in indoor spaces.

Building Maintenance - Custodial activities should be performed when building occupancy is at its lowest level. This is to prevent occupants from being exposed to potentially irritating custodial chemicals and airborne dust.

Building maintenance services should have an active Right-To-Know program. This program should include maintaining all MSDS's on site for any custodial chemicals.

Carpeting - Carpets should be vacuumed at the end of each day for areas that are regularly occupied. Steam cleaning via a steam extraction method should be performed whenever the carpets are visibly dirty. This should be done at least twice a year.

If carpets are worn and have exceeded their useful life, both the carpets and their padding should be removed and replaced.

Carpets and carpet backing should be kept as dry as possible to prevent microbial growth. Carpets that are repeatedly wet should be removed. Non-porous flooring such as tile should be investigated in these cases.

Dusting - Dusting should be performed at least once a week of all office furnishings. Furnishings include desktops, file cabinets, bookcases, lights, and HVAC grilles.

Floors - Floors, and other non-porous flooring, should be swept at least once a day. Floors should be swept during non-occupied hours to minimize dust exposure.

Vacuuming and wet mopping can be substituted for sweeping. Vacuuming should be performed with a HEPA type vacuum cleaner.

Garbage - Lunch room garbage and trash in waste cans should be taken out each night.